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SITE MONITORING

Liebert
Keeping Business in Business

MR1

Mini-Remote Environmental Monitor

USER MANUAL

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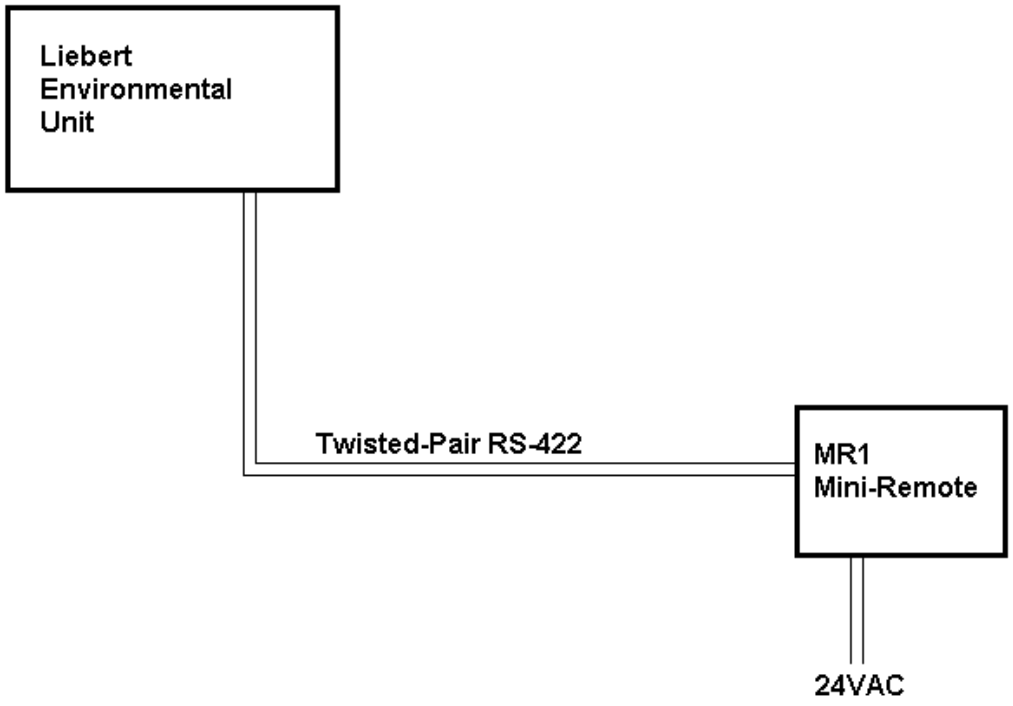

Figure 1. Typical System Configuration

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Section 1: INTRODUCTION

The Liebert MR1 Mini-Remote monitors the operating status and controls the operation of your Liebert Environmental unit. It serves as a remote user interface, supplementing the unit-front controls.

The MR1 is compatible with all Liebert microprocessor-controlled Environmental units, including:

- Deluxe System 3 and Challenger units with
  - Advanced Microprocessor with Graphics
  - Advanced Microprocessor
  - Standard Microprocessor
  - Level 10
  - Level 00
- Mini-Mate2 ceiling-mounted units
- Mini-Mate, Mini-Mate Plus and Data-Mate units with Small Systems Controllers.

An LCD display provides temperature, humidity, status and alarm information. The MR1 provides both visual and audible annunciation of alarms from the Environmental unit. Unmarked "hidden" buttons allow the MR1 user to access setpoints and settings.

Specifications

Electrical Specifications:

Voltage:	24 VAC, +/-10% of nominal
Power:	7.5 VA
Phase:	1
Frequency:	50/60 Hz

Environmental Conditions:

Operating Temperature:	5°C to 40°C
Operating Relative Humidity:	0% to 95% (non-condensing)
Operating Altitude:	up to 2000 meters

Dimensions:

Display Panel:	3 1/2"H x 5"W x 1 1/8"D	0.5 lbs
	89mm x 127mm x 29mm	0.23 kg
Electrical Box:	4 3/4" H x 4 3/4"W x 2 3/4"D	
	121mm x 121mm x 70mm	0.91 kg

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NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE

When the following symbols are displayed, they indicate:

a. Earth grounding conductor

b. Alternating Current

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Section 2: INSTALLATION

Mounting

The MR1 Mini-Remote is completely tested, then shipped from the factory disassembled for your convenience during installation. To begin flush-mount installation, please refer to Figure 2A. An optional 30-foot control cable can be supplied to allow the display to be located remotely from the electrical box. Refer to Figure 2b.

The electric box containing the power supply is designed for flush-mounting into a finished interior wall. A wall plate is supplied to cover the drywall opening, with the display mounted directly in front of the wall plate/electric box.

***NOTE**: Use minimum 18 gauge wire for all customer interface wiring.*

1. Mount the electric box (Item 5) in the wall at a convenient location.
2. Make each power and unit connection (to Item 4) by inserting bare wire end into compression terminal and tightening screw. Refer to **Electrical Connections** section. If 30-foot cable is used, disconnect factory wire harness and attach cable to screw terminals per Figure 2.
3. Route control cable through wall plate and electric box cover, then connect to electrical box at TB1 (on Item 4).
4. Attach electric box cover (Item 3) with two (2) screws.
5. Remove the front cover from the MR1 display panel (Item 1) by gently prying open at the slots on the top and bottom of the display. Attach the control panel rear plastic and the wall plate (Item 2) to the electric box with two (2) screws.
6. Snap display panel front onto the rear plastic part.
7. Apply power to the MR1. Operate the system to test status and alarm monitoring, and customer selected options including on/off control. Also test optional customer interface (4 inputs and 1 output), if applicable.

Call Liebert Environmental Support at 1-800-543-2778 if assistance is required for the installation or operation of the Mini-Remote.

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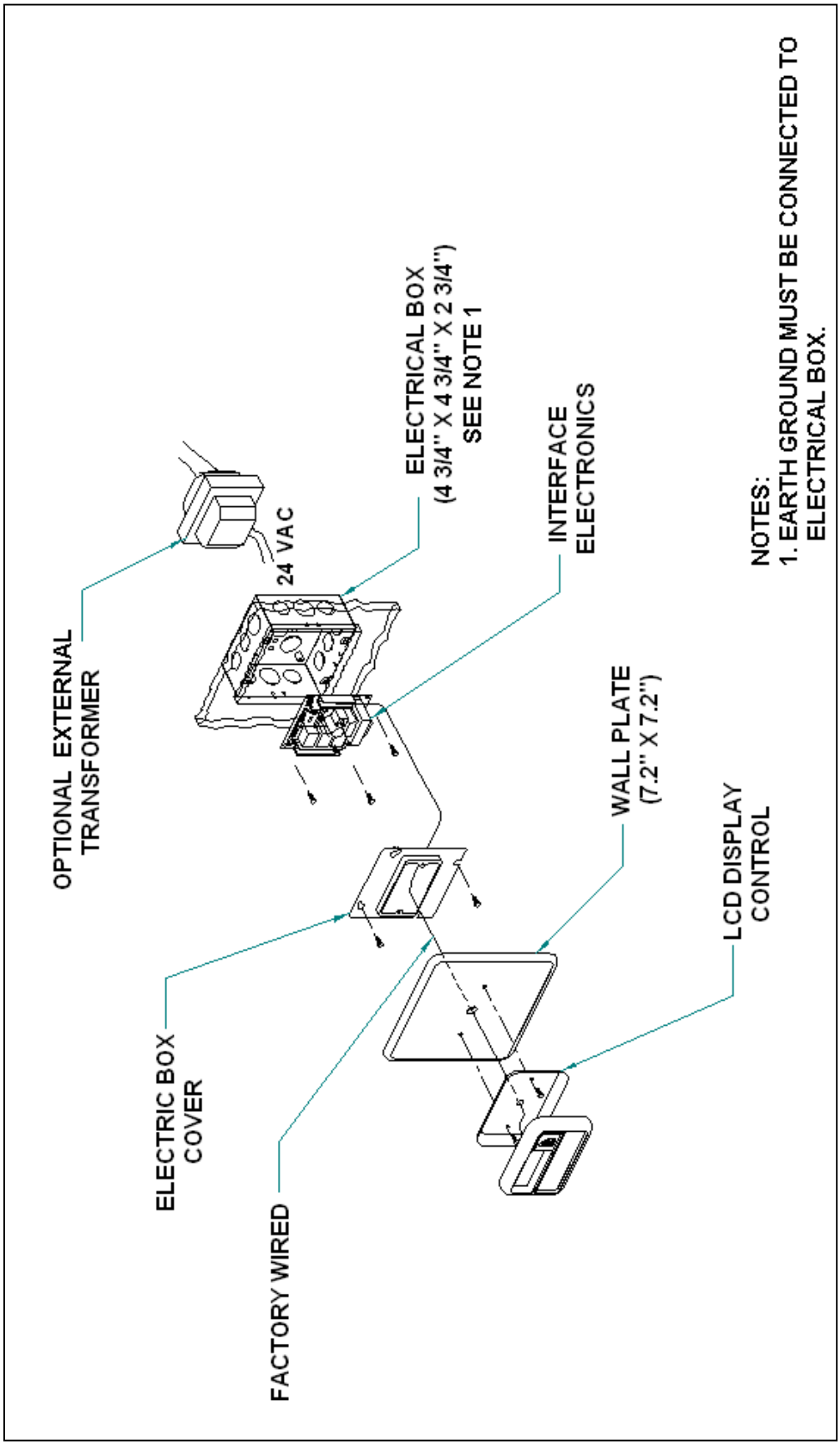
OPTIONAL EXTERNAL TRANSFORMER
24 VAC
ELECTRICAL BOX (4 3/4" X 4 3/4" X 2 3/4") SEE NOTE 1
INTERFACE ELECTRONICS
NOTES:
1. EARTH GROUND MUST BE CONNECTED TO ELECTRICAL BOX.
WALL PLATE (7.2" X 7.2")
LCD DISPLAY CONTROL
ELECTRIC BOX COVER
FACTORY WIRED

Figure 2a. Flush-Mount Installation

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Electrical Connections

The MR1 Mini-Remote requires a two-wire connection (field-supplied) to communicate with the Environmental unit under its control. The stranded twisted-pair connects to the MR1 interface board at TB2-11 (T+) and TB2-12 (T-). Refer to Table 1 below for the connections at the Environmental unit. Note that maximum length for RS-422 communications is 1000 feet, and minimum of 22 gauge wire should be used for all field wiring.

Power for the MR1 is supplied to TB3-1 and TB3-2. Maximum current draw is 0.3A at 24VAC. It is recommended that the MR1 be powered independently from an external 24VAC transformer; optionally, it may draw power from the Environmental unit. However, if the MR1 is located greater than 300 feet (100 meters) from the Environmental unit, an external transformer must be used.

Caution: *Ensure Environmental unit has sufficient 24VAC power to support the MR1, Liqui-tects or any other auxiliary device.*

Liebert Environmental Controller	24VAC Auxiliary Power	Connection to MR1 TB2-11 (T+) TB2-12 (T-)
SM - Standard **AM/AG** - Advanced **L10** - Level 10 Microprocessors	Terminal T5 Terminal G5	Terminal 78 (T+) Terminal 77 (T-)
L00 - Level 00 Microprocessor	TB1-1 TB1-5	Terminal 78 (T+) Terminal 77 (T-)
Mini-Mate 2	-	TB4-1 (T+) TB4-2 (T-)
SSC - Small System Controller	-	TB2-1 (T+) TB2-2 (T-)

Table 1: Connection Summary

The MR1 provides a Common Alarm Output, at TB2-9 and TB2-10. This dry-contact is rated for 5A, at 24VDC or 120VAC.

There are four optional Customer Alarm inputs that may be used on the MR1 (see Hardware Configuration). The inputs are triggered by contact-closures, and the contacts are rated for 5A, at 24VDC or 120VAC as well. The connection points and display mapping are as follows:

NOTE: *New Feature. The inputs are now contact-closure – 24VAC powered inputs are no longer necessary.*

NOTE: *Exercise caution if installing new MR1 as replacement unit: remove power from signal inputs, or damage to unit may occur!*

Local Alarm 1:	TB2-3	&	TB2-4
Local Alarm 2:	TB2-1	&	TB2-2
High Water Alarm:	TB2-5	&	TB2-6
High Head Alarm:	TB2-7	&	TB2-8

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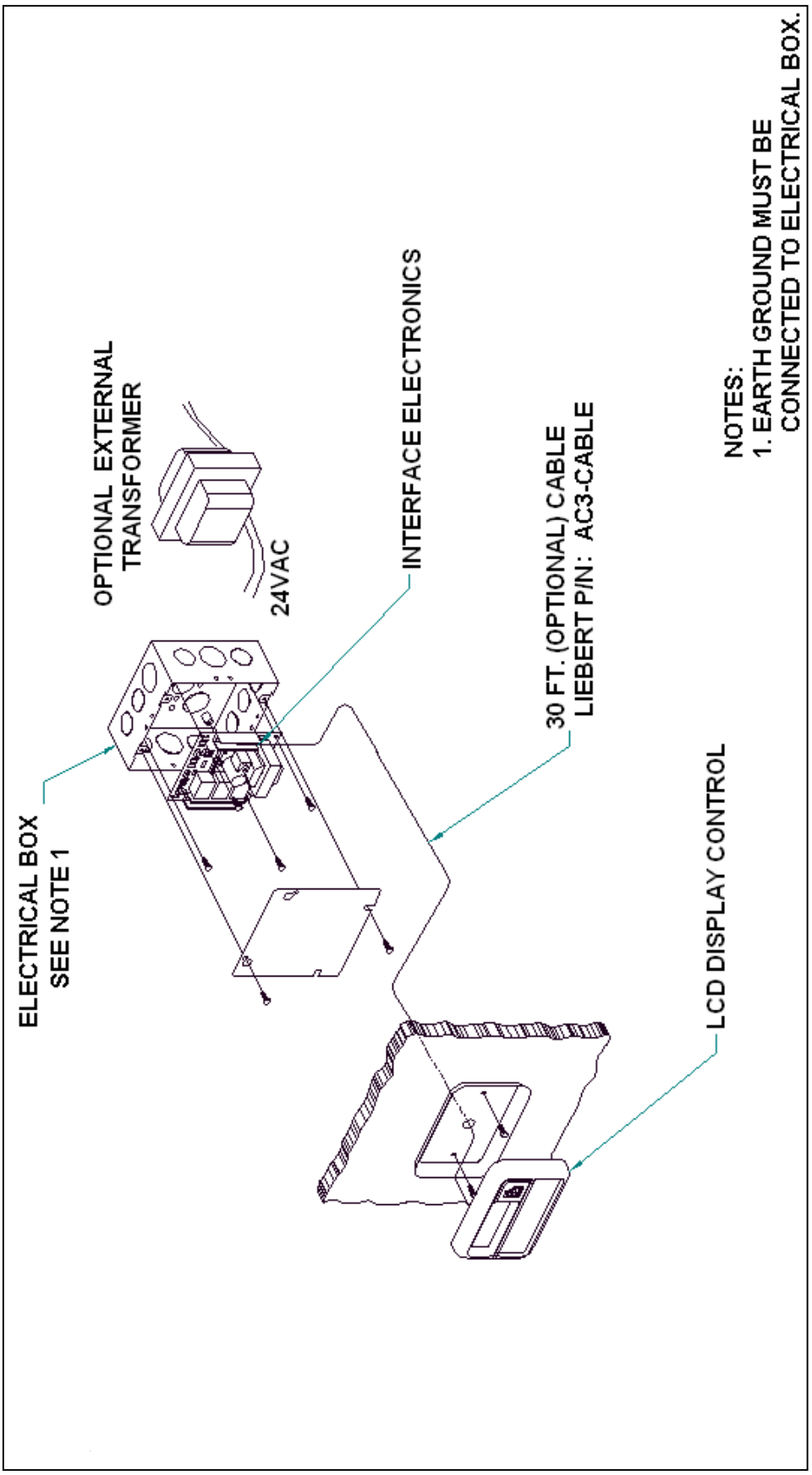

Figure 2b. Display Panel Mounted Remotely from Electrical Box

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Section 3: HARDWARE CONFIGURATION

DIP Switch Settings

The following user selectable operations are set by **DIP SW1** on the display panel circuit board: Refer to Table 2 and Figure 3.

Position	OFF	ON
1	Audible beeper enabled	Audible beeper disabled
2	Remote on/off disabled. On/off button affects MR1 operation only	Remote on/off of Env. unit enabled. Env. unit must have remote on/off capability, or MR1 will not be able to perform this function
3	Optional alarm inputs disabled	4 optional alarm inputs enabled
4	Common alarm follows alarm condition	Common alarm de-energized when alarm is silenced

Table 2: DIP Switch Settings

Note that factory default is OFF for all four positions.

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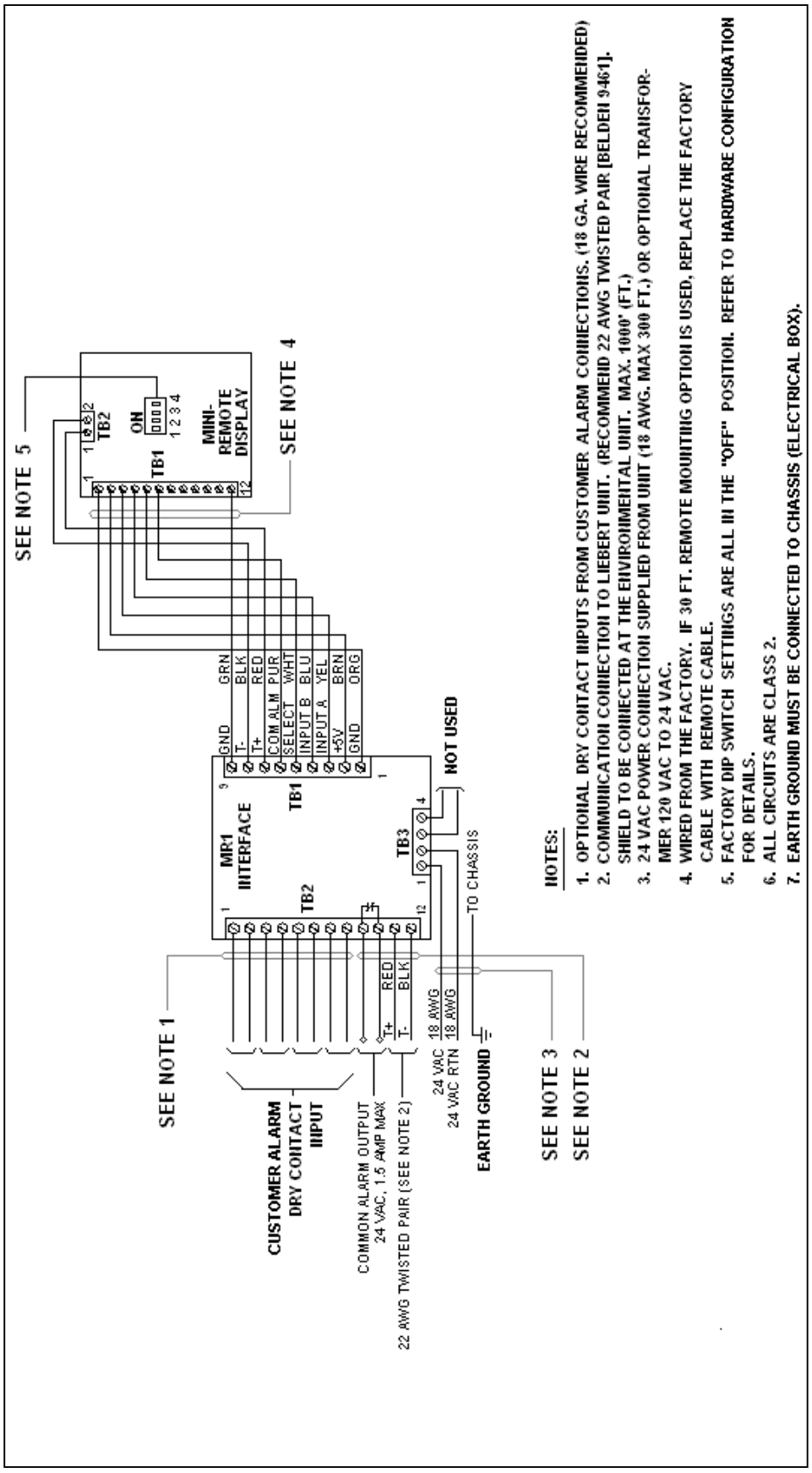
SEE NOTE 5
SEE NOTE 4
SEE NOTE 1
SEE NOTE 3
SEE NOTE 2
TB2
ON
1 2 3 4
TB1
MINI-
REMOTE
DISPLAY
MP1
INTERFACE
TB1
TB2
TB3
GND GRN
T- BLK
T+ RED
COM ALM PUR
SELECT WHT
INPUT B BLU
INPUT A YEL
+5V BRN
GND ORG
NOT USED
TO CHASSIS
CUSTOMER ALARM
DRY CONTACT
INPUT
COMMON ALARM OUTPUT
24 VAC, 1.5 AMP MAX
22 AWG TWISTED PAIR (SEE NOTE 2)
T+ RED
T- BLK
24 VAC 18 AWG
24 VAC RTN 18 AWG
EARTH GROUND
NOTES:
1. OPTIONAL DRY CONTACT INPUTS FROM CUSTOMER ALARM CONNECTIONS. (18 GA. WIRE RECOMMENDED)
2. COMMUNICATION CONNECTION TO LIEBERT UNIT. (RECOMMEND 22 AWG TWISTED PAIR [BELDEN 9461].
SHIELD TO BE CONNECTED AT THE ENVIRONMENTAL UNIT. MAX. 1000' (FT.)
3. 24 VAC POWER CONNECTION SUPPLIED FROM UNIT (18 AWG, MAX 300 FT.) OR OPTIONAL TRANSFOR-
MER 120 VAC TO 24 VAC.
4. WIRED FROM THE FACTORY. IF 30 FT. REMOTE MOUNTING OPTION IS USED, REPLACE THE FACTORY
CABLE WITH REMOTE CABLE.
5. FACTORY DIP SWITCH SETTINGS ARE ALL IN THE "OFF" POSITION. REFER TO HARDWARE CONFIGURATION
FOR DETAILS.
6. ALL CIRCUITS ARE CLASS 2.
7. EARTH GROUND MUST BE CONNECTED TO CHASSIS (ELECTRICAL BOX).

Figure 3. Electrical Connections, Electric Box and Display

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Section 4: OPERATION

LCD and Keypad

When power is first applied, the MR1 performs self-initialization and then enters the normal display mode. The display alternates between showing the temperature and humidity readings, and cooling/heating, de/humidification, and econocycle operating status.

Pressing the HOLD button will lock on the temperature or humidity reading, continuously updating it two times per second. It will continue to display the same parameter until the SCAN button is pressed or a new alarm occurs.

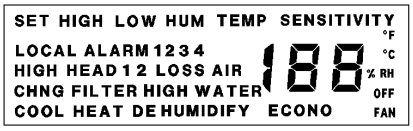

Figure 4. LCD Display

When you press the SCAN button, the MR1 first scans through the active alarms if any exist, then scans through the heating, cooling, de/humidification, and econocycle/capacity. On chilled water/hot water units, percent capacity indicates the valve position. On units equipped with econocycle, cooling will reflect the valve position. If econocycle is not available, econocycle capacity status is skipped.

While scanning, the HOLD button can be pressed to lock the display on the current item for continuous updating. To return to scanning, press the SCAN button again. After all parameters have been displayed, the monitor returns to the normal alternating status display.

Should a new alarm occur while scanning (or at any other time), the MR1 immediately displays the alarm and annunciates it if the beeper is enabled. The alarm can be silenced by pressing the SILENCE button. On Small Systems Controls, silencing an alarm at the MR1 will also silence the alarm at the unit; on other microprocessors, an alarm that is no longer active can be reset from the MR1 by pressing the SILENCE button.

OFF is displayed when the MR1 has been turned off; OFF flashes if communication between the MR1 and the Environmental unit is disrupted.

With DIP switch #2 in the ON position and monitoring a unit equipped with remote on/off capability, pressing the ON/OFF

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button will turn on/off the unit being monitored and the MR1. With DIP switch #2 in the OFF position, pressing the ON/OFF button will turn toggle the on/off operation of the MR1 only.

Setpoint Control

There are two hidden buttons on the MR1 keypad. These buttons are not labeled on the display to prevent untrained personnel from accessing unit settings.

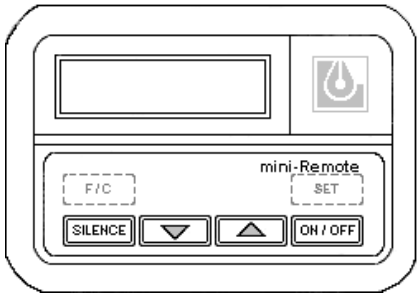

Figure 5. Display Panel

The F/C button will toggle between degrees Fahrenheit and degrees Celsius for the temperature display.

The SET button will put the MR1 in the set mode. The SET icon in the upper left of the LCD will be displayed along with other icons to indicate which setpoint is being viewed or changed. Use the ⇩/SCAN and the ⇧/HOLD buttons to change the setpoint. The display will change with each key press to indicate the new value of the setpoint. If the value does not change, then the environmental unit is not accepting the new value because it is out of range. The displayed value is always the actual setpoint in the environmental unit. There are 8 setpoints that can be changed. The SET button is pressed to advance to the next setpoint. After all 8 setpoints have been stepped through, the MR1 will go back to the normal display mode. The SILENCE button can be pressed at any time to exit the set mode.

The 8 setpoints are:

1. Temperature Setpoint
2. Temperature Sensitivity
3. Humidity Setpoint
4. Humidity Sensitivity
5. High Temp Alarm
6. Low Temp Alarm
7. High Hum Alarm
8. Low Hum Alarm

Note that the temperature sensitivity is in tenths but there is no decimal point on the MR1 display so, for example 1.4 is displayed as 14.

Refer to Table 3 for availability by microprocessor of setpoint control:

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Setpoint	AM/AG	SM	L10	L00	MM2	SSC
On/Off	✓	**	✓	**	✓	✓
Temperature	✓	✓	✓	✓	✓	
Temp Sensitivity	✓	✓	✓	✓	✓	
Humidity	✓	✓	✓	✓	✓	
Humidity Sensitivity	✓	✓	✓	✓	✓	
High Temperature Alarm	✓		✓		✓	
Low Temperature Alarm	✓		✓		✓	
High Humidity Alarm	✓		✓		✓	
Low Humidity Alarm	✓		✓		✓	

Table 3: Setpoint Control by Microprocessor

** Modification to the K3 common alarm relay on the microprocessor controls of the Environmental unit is necessary to enable remote on/off – this modification will necessarily eliminate the common alarm relay output. Refer to the Installation / Operations Manual of the Environmental unit, or consult Liebert Environmental Support.

Note that if the high/low temperature and humidity alarm setpoints are disabled at the unit controls, then the MR1 will display 00 for the setpoint. The MR1 is not able to remotely enable alarm setpoints.

The MR1 will annunciate any alarm transmitted by the Environmental controls. Table 4 catalogs the available alarms by microprocessor level.

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Alarm	AM/AG	SM	L10	L00	MM2	SSC
High Temperature	✓	✓	✓	✓	✓	✓
Low Temperature	✓	✓	✓	✓	✓	✓
High Humidity	✓	✓	✓	✓	✓	✓
Low Humidity	✓	✓	✓	✓	✓	✓
High Head Pressure 1	✓	✓	✓	✓	✓	
High Head Pressure 2	✓	✓	✓	✓	✓	
Loss of Airflow	✓	✓	✓	✓	✓	
Liquid Detected	✓	✓	✓	✓	✓	
Change Filters	✓	✓	✓	✓	✓	
Humidifier Problem	✓		✓		✓	
No Water in Hum'fier Pan	✓		✓		✓	
Standby Glycool Unit On	✓		✓		✓	
Compressor 1 Overload	✓		✓		✓	
Compressor 2 Overload	✓		✓		✓	
Main Fan Overload	✓		✓		✓	
Manual Override	✓		✓		✓	
Smoke Detected	✓		✓		✓	
Loss of Water	✓		✓		✓	
Standby Unit On	✓		✓		✓	
Low Suction	✓		✓		✓	
Short Cycle	✓		✓		✓	
Loss of Power	✓		✓		✓	
Inverter Bypass	✓		✓		✓	
Standby Fan On	✓		✓		✓	
Loss of Emergency Power	✓		✓		✓	
Local Alarm [1]	✓	✓	✓	✓	✓	
Local Alarm 2	✓		✓		✓	

Table 4: Alarms by Microprocessor

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MR1

Mini-Remote Environmental Monitor

THE COMPANY BEHIND THE PRODUCTS

With more than 500,000 installations around the globe, Liebert is the world leader in computer protection systems. Since its founding in 1965, Liebert has developed a complete range of support and protection systems for sensitive electronics:

- Environmental systems: close-control air conditioning from 1.5 to 60 tons.
- Power conditioning and UPS with power ranges from 250 VA to more than 1000 kVA.
- Integrated systems that provide both environmental and power protection in a single, flexible package.
- Monitoring and control – on-site or remote – from systems of any size or location.
- Service and support, through more than 100 service centers around the world, and a 24-hour Customer Response Center.

LIEBERT CORPORATION

1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229
800.877.9222 PHONE
614.841.6022 FAX

LIEBERT EUROPE

GLOBE PARK
MARLOW
BUCKINGHAMSHIRE SL7 1YG
UNITED KINGDOM
+44.1628.403200 PHONE
+44.1628.403203 FAX

LIEBERT ASIA

19/F, CAUSEWAY BAY PLAZA
489 HENNESSY ROAD
CAUSEWAY BAY
HONG KONG
852.2.572.2201 PHONE
852.2.831.0114 FAX

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http://www.liebert.com

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